

Botulism (*Clostridium botulinum*)

Report Immediately

February 2003

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Botulism is caused by exposure to a neurotoxin produced by *Clostridium botulinum*, an anaerobic, spore-forming bacterium. The toxin is produced as the bacteria are multiplying under anaerobic (no oxygen) and low acid (generally pH>4) conditions. There are seven types of botulinum toxin (A–G), but human botulism is primarily caused by types A, B and E.

B. Clinical Description and Laboratory Diagnosis

C. botulinum toxin is one of the most potent lethal substances known. In humans, botulism manifests itself in one of four clinical forms: foodborne botulism, wound botulism, infant (intestinal) botulism, and rarely adult infectious (intestinal) botulism. The site of toxin production is different for each of the forms, but they all share the flaccid paralysis that results from botulinum neurotoxin.

Foodborne botulism is a severe poisoning caused by the ingestion of pre-formed *C. botulinum* toxin. The clinical picture is dominated by neurologic signs and symptoms, including blurred or double vision, dysphagia, dry mouth and peripheral muscle weakness. Symmetric descending flaccid paralysis is classic for botulism, beginning with the cranial nerves. Paralysis then affects the upper extremities, the respiratory muscles, and finally the lower extremities. Patients usually require ventilatory support, which is commonly needed for 2 to 8 weeks. The clinical symptoms are similar no matter which toxin type is responsible for the illness, but type A has been associated with a higher case-fatality ratio than B or E. In general, the case-fatality ratio for foodborne botulism is 5-10%. Recovery may take months.

Wound botulism usually presents with the same clinical picture as foodborne botulism. In wound botulism, the organism multiplies in the wound and produces the toxin, which is then absorbed into the bloodstream.

Infant (intestinal) botulism has a distinctly different clinical presentation than wound and foodborne botulism. In infant botulism, the *C. botulinum* spores are ingested and the toxin is formed in the intestines in the absence of mature gastrointestinal flora. This disease is usually confined exclusively to infants less than one year of age. The earliest clinical sign in infant botulism is constipation, which is followed by poor feeding, decreased sucking, lethargy, listlessness, ptosis (droopy eyes), difficulty swallowing, a weak cry, and lack of muscle tone giving rise to the term “floppy baby syndrome.” In some cases, respiratory insufficiency and respiratory arrest may occur. Infant botulism presents with a wide range of severity, from mild illness to sudden death. Some studies suggest that infant botulism may be responsible for up to 5% of cases of sudden infant death syndrome (SIDS). Among hospitalized cases in the United States, the case-fatality ratio is less than 1%.

Adult infectious (intestinal) botulism occurs as a result of toxin production in the intestines in a manner similar to infant botulism. Most people with adult infectious botulism are found to have suffered from a disruption of their natural intestinal flora due to abdominal surgery, antibiotic treatment or gastrointestinal tract abnormalities.

Laboratory diagnosis: foodborne botulism is diagnosed by demonstration of botulinum toxin in serum, stool, gastric aspirate, or incriminated food; or by culture of *C. botulinum* from gastric aspirate or stool. Intestinal botulism is established by identification of *C. botulinum* and/or toxin in patient feces, toxin is rarely present in serum. Wound botulism is confirmed by demonstration of toxin in serum or positive wound culture of *C. botulinum*.

C. Reservoirs

C. botulinum spores are ubiquitous in soils worldwide; they are frequently recovered from agricultural products, including honey. The spores can survive indefinitely in soil under almost any environmental condition. Spores are also found in marine sediments and in the intestinal tract of animals, including fish.

D. Modes of Transmission

Foodborne botulism is acquired by ingesting pre-formed toxin. This usually occurs as a result of ingesting food that has been inadequately processed and then inadequately prepared before being eaten. The most frequent source is home-canned foods, but outbreaks have also been attributed to baked potatoes in foil, minced garlic in oil and sautéed onions held under a layer of butter. Tomato products, once thought to be a low-risk food due to a low pH, can no longer be dismissed as a potential vehicle. The toxin is destroyed by boiling.

Wound botulism occurs when wounds are contaminated with dirt or gravel containing botulism spores. Wound botulism has also been reported among chronic drug abusers.

Infant (intestinal) botulism, which is the most common form of botulism in the United States, occurs as a result of ingestion of the spore form of the bacteria, which then goes on to germinate and produce toxin in the intestines. This can happen through ingestion of food, soil or dust contaminated with botulinum spores. Honey often contains *C. botulinum* spores. Some cases of infant botulism have occurred in children living in areas of construction and earth disruption.

Adult infectious (intestinal) botulism occurs in a manner similar to infant botulism.

E. Incubation Period

The incubation period is variable, but neurologic symptoms of foodborne botulism usually appear within 12–36 hours (range: 6 hours to 8 days) after eating contaminated food. In general, the shorter the incubation period, the more severe the disease, and the higher the case-fatality ratio. The median incubation period for wound botulism is generally longer than for foodborne botulism, usually 7 days, with a range of 4 to 14 days. In general, the shorter the incubation period, the more severe the disease. The incubation period for infant botulism is unknown since it is usually not known when the spores were ingested.

F. Period of Communicability or Infectious Period

No instances of person-to-person spread have ever been documented for botulism.

G. Epidemiology

Botulism occurs worldwide, as sporadic cases and as family and general outbreaks. In the United States, since 1973 an average of 24 cases of foodborne botulism, 3 cases of wound botulism and 71 cases of infant botulism have been reported annually to the Centers for Disease Control and Prevention (CDC). Since 1994, the use of black tar heroin by chronic injection drug users has led to a dramatic increase in the number of cases of wound botulism.

H. Bioterrorist Potential

C. botulinum toxin is considered a potential bioterrorist agent. If acquired and properly disseminated, botulinum toxin could cause a serious public health challenge in terms of ability to limit the numbers of casualties and control other repercussions from such an attack. Although the greatest threat may be via aerosol use, the more common threat may be via its use in food and drink. The occurrence of even a single case of botulism, especially if there is no obvious source of an improperly preserved food, should raise the possibility of deliberate use of botulinum toxin. All such cases should be reported immediately so that appropriate investigations can be initiated without delay.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. New Jersey Department of Health and Senior Services (NJDHSS) Case Definition

CASE CLASSIFICATION

CONFIRMED

Foodborne botulism: A clinically compatible case, **AND**

- detection of botulinum toxin in serum, stool, or patient's food, **OR**
- isolation of *C. botulinum* from stool.

Infant botulism: A clinically compatible case, **AND**

- detection of botulinum toxin in stool or serum, **OR**
- isolation of *C. botulinum* from stool.

Wound botulism: A clinically compatible case, with no exposure to contaminated food, with history of a fresh, contaminated wound during the 2 weeks before onset of symptoms, **AND**

- detection of botulinum toxin in serum, **OR**
- isolation of *C. botulinum* from a wound.

Other botulism: A clinically compatible case, older than 1 year, who has **NO** history of ingestion of suspected food and has no wounds, **AND**

- detection of botulinum toxin in clinical specimen, **OR**
- isolation of *C. botulinum* in clinical specimen.

PROBABLE

This term is only used for a case of **Foodborne botulism** when a clinically compatible case is epidemiologically linked (e.g., ingestion of a home-canned food within the previous 48 hours) to a confirmed case.

POSSIBLE

Not used.

Note: See Section 3 C below for information on how to report a case.

B. Laboratory Testing Services Available

The New Jersey Public Health and Environmental Laboratories (PHEL) will test clinical specimens for the presence of both *C. botulinum* and botulinum toxin if epidemiologically and clinically indicated. The most reliable method for testing for toxin is the mouse neutralization test. Due to the nature of the laboratory testing for *C. botulinum* toxin and bacteria, testing will only be done if epidemiologically and clinically indicated. For more information call the PHEL at 609.292.8396 or the Communicable Disease Service at 609.588.7500.

The Microbiology Laboratory at the PHEL will test food specimens for the presence of *C. botulinum* and/or toxin if epidemiologically indicated. For more information call the Microbiology Laboratory at 609.292.8396.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To assist in the diagnosis and treatment of potential cases.
- To identify sources of public health concern (e.g., a commercially distributed food product) and to stop transmission from such a source.
- To properly classify reported cases as foodborne, infant or wound botulism.

- To identify cases and clusters of human illness that may be associated with a bioterrorist event.

B. Laboratory and Healthcare Provider Reporting Requirements

Due to the rarity, potential severity, and possibility of bioterrorism involvement, the New Jersey Department of Health and Senior Services requests that laboratories and healthcare providers **immediately report** to the local health officer having jurisdiction over the locality in which the patient lives, or, if unknown, to the health officer in whose jurisdiction the health care provider requesting the laboratory examination is located any case and suspect case of botulism. If this is not possible, call the NJDHSS Infectious and Zoonotic Diseases Program at 609.588.7500 during business hours, 609.392.2020 after business hours, on weekends and holidays. Such telephone report shall be followed up by a written or electronic report within the 24 hours of the initial report. A case of botulism is defined by the reporting criteria in Section 2A above. Since botulism testing is only available at the PHEL or the CDC, the NJDHSS Infectious and Zoonotic Disease Program must be informed to approve appropriate testing.

C. Local Department of Health Reporting and Follow-Up Responsibilities

1. Reporting Requirements

The New Jersey Administrative Code (N.J.A.C. 8:57-1.8) stipulates that each local health officer must report the occurrence of any case of botulism, as defined by the reporting criteria in Section 2 A above. Current requirements are that cases be reported to the NJDHSS Infectious and Zoonotic Diseases Program using the [CDS-1 form](#). A report may also be filed electronically over the Internet using the confidential and secure Communicable Disease Reporting System (CDRS).

2. Case Investigation

- The most important step a local health officer can take if he/she learns of a suspect case of botulism, or any suspected exposure that may represent an act of bioterrorism, is to immediately call NJDHSS Infectious and Zoonotic Diseases Program, at 609.588.7500 and 609. 588.3121 during business hours or 609.392.2020 after working hours.**
- The NJDHSS Infectious and Zoonotic Diseases Program will direct the case investigation of botulism in New Jersey residents. If a bioterrorist event is suspected, the NJDHSS in conjunction with the CDC and other response authorities, will work closely with local health officers and provide instructions/information on how to proceed.
- Following immediate notification of the NJDHSS, the local health officers may be asked to assist in investigating any case(s) of botulism. The official case report using [CDS-1 form](#) should follow notification.
- Use the following guidelines to investigate:
Determine type of botulism: Foodborne botulism is a true medical and public health emergency and should be investigated as such; infant and wound botulism do not require the same urgency in investigation. Therefore, it is essential to determine what illness is occurring. **All types of botulism should be reported to NJDHSS using [CDS-1 form](#). A report may also be filed electronically over the Internet using the confidential and secure Communicable Disease Reporting System (CDRS).**
 - 1) Accurately record the type of botulism: foodborne, intestinal, wound, etc.
 - 2) Record the demographic information, date of symptom onset, symptoms, and medical information.
 - 3) Use these specific guidelines to investigate:

Foodborne botulism

The source of the intoxication and other potentially exposed persons must be identified. The case must be interviewed concerning possible food sources. In most cases, this information will need to be obtained from family members or other close contacts, since the patient will most likely not be in a condition to be interviewed. The NJDHSS Food and Drug Safety Program (FDSP) in Consumer and Environmental Health Services must be contacted for assistance in determining possible food sources. Please call the NJDHSS Food and Drug Safety Program at 609.588.3123. The following guidelines would assist the local health departments in the investigation.

- a) Identify all home-canned foods eaten during the week prior to symptoms. The most suspect foods are those eaten less than two days before onset, those that are low in acid and those that were not eaten by other persons that remain well. Keep in mind that some cases may experience symptoms later than the case or that are less severe than those of the case.
- b) Identify all commercially canned foods eaten during the week prior to the onset of illness. For implicated foods, determine the brand, manufacturer, package size, lot number, and place and date of purchase.
- c) Identify all sausage and other preserved meats eaten during the week prior to onset of illness. Meat products that have not been adequately refrigerated should also be suspected.
- d) Identify all smoked, uneviscerated or otherwise preserved fish eaten during the week before onset of symptoms.
- e) Identify food items that may have been prepared in oil such as garlic in oil products and sautéed onions.
- f) Identify products that may have been packaged using Modified Atmosphere Packaging.
- g) Identify other potentially exposed persons. Other persons who have eaten implicated food must be reached as soon as possible and advised to seek health care immediately. Depending on the time of ingestion, other exposed persons might be candidates for purging and at the very least should be under close medical supervision.
 1. Obtain the name, address, and telephone number of every person who may have eaten the suspected food item.
 2. Obtain the name, address, and telephone number of every person who may have the suspect home-processed food in his or her possession.
- h) Remove implicated food items from the environment for testing. A decision about culturing implicated food items must be made in consultation with an epidemiologist in the Infectious and Zoonotic Diseases Program. Coordination for pickup and testing of food samples is the responsibility of the local health departments. If a commercial product is suspected, report this to the NJDHSS Food and Drug Safety Program at 609.588.3123 to coordinate follow-up with relevant outside agencies.

Wound botulism: No follow-up required.

Intestinal botulism (Infant botulism): Ask caretakers about honey consumption and construction sites in the vicinity of the child residence; otherwise, extensive epidemiological follow-up is not usually required. Education should be provided regarding prevention.

Adult infectious botulism: As with infant botulism, extensive epidemiological follow-up is not usually required. Education should be provided regarding prevention.

- 4) If there have been several attempts to obtain patient information (e.g., the patient or healthcare provider does not return calls or respond to a letter, or the patient refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as possible. Please note on the form the reason why it could not be filled out completely. **If CDRS is used to report, enter collected information into the “Comments” section.**

After completing the form, it should be faxed to the NJDHSS Infectious and Zoonotic Diseases Program, fax number 609.631.4863, or the report can be filed electronically over the Internet using the confidential

and secure Communicable Disease Reporting System (CDRS). Call the IZDP at 609.588.7500 to confirm receipt of your fax.

- e. **Botulism Testing:** In all cases of suspected botulism a determination is made by the Communicable Disease Service and the case's healthcare provider, based on available clinical and epidemiological data, about the appropriateness of botulism testing. Arrangements will then be made for the submission of appropriate specimens.
- f. **Botulism Antitoxin:** Antitoxin therapy is only administered to adult patients with foodborne or wound botulism. Antitoxin is not indicated in cases of infant botulism. Antitoxin is a horse serum product and may cause serum sickness in approximately 20% of treated persons. The healthcare provider in consultation with the Communicable Disease Service must determine the need for antitoxin therapy. Additionally, CDC must release and approve its use. If needed, antitoxin will be immediately flown to the nearest airport. The local health officer should be prepared to assist with logistic arrangements. The decision to administer antitoxin must be made immediately. The longer the wait, the less effective antitoxin will be. Since testing for the presence of toxin or bacteria in clinical specimens can take many days, the decision to administer antitoxin cannot wait for testing to confirm the infection.
- g. Institution of disease control measures is an integral part of a case investigation. It is the local health officer's responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4, "Controlling Further Spread."

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (N.J.A.C. 8:57-1.12)

Minimum Period of Isolation of Patient

No restrictions.

Minimum Period of Quarantine of Contacts

No restrictions.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

Reported Incidence Is Higher than Usual/Outbreak Suspected

Any case of botulism is considered a public health emergency and a possible outbreak and must be investigated to determine the source of infection and mode of transmission. See Section 3 C above for the proper response to a case of suspect or confirmed botulism.

Note: If an act of bioterrorism is suspected, the NJDHSS and other response authorities will work closely with local boards of health and provide instructions/information on how to proceed.

Foodborne botulism

The NJDHSS Food and Drug Safety Program (FDSP) will initiate food sampling, embargoes, recalls and voluntary destructions as required and will coordinate the trace back of commercial sources of implicated food products with the U.S. Food and Drug Administration (FDA), U.S. Department of Agriculture (USDA), and other states if necessary. Please call the NJDHSS Food and Drug Safety Program at 609.588.3123.

D. Preventive Measures

Personal Preventive Measures/Education

To avoid future exposures, recommend that individuals:

- Persons who are interested in home canning and other preservation techniques should be educated about the NJDHSS, Division of Consumer Health and Environmental Services, Food and Drug Safety Program phone 609.588.3123 or [FDA](#) website.
- Not open bulging containers, and not eat or even “taste-test” foods with off odors.
- Not feed honey to children less than one year old.

ADDITIONAL INFORMATION

A [Foodborne Botulism Fact Sheet](#) and [Infant Botulism Fact Sheet](#) can be obtained at the NJDHSS website at <http://www.state.nj.us/health>, click on the “Topics A to Z” link and scroll down to subject *Botulism*.

The CDC surveillance case definition for botulism is the same as the criteria outlined in Section 2A of this chapter. CDC case definitions are used by state health departments to maintain uniform standards for national reporting. When reporting to the NJDHSS, always refer to the criteria in Section 2A.

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